

CONSERVATION AND UTILISATION OF ECOGENETIC RESOURCES OF PANCHPATMALI HILL IN ORISSA¹

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As many as 160 wild species belonging to 53 families occur in the Panchpatmali hill. The flora has both South Indian and Himalayan representatives due to the geographical position of the area. Efforts made by the National Aluminium Co. to conserve the regional flora and maintain the environmental status have been examined.

INTRODUCTION

The Panchpatmali hill on Damanjodi is located in the Koraput district of Orissa between 18° 45' and 19° 55' N latitude and 82° 58' and 83° 04' E longitude. The Panchpatmali hill has one of the largest deposits of bauxite ore in India, which is being mined for the extraction of alumina by the National Aluminium Company (NALCO). This hill range is considered as the northernmost part of the Eastern Ghats.

The floristic and ecogenetic resources survey of the hill was undertaken in the year 1992-93. The objective of the survey was to study the biodiversity of flora, and enumerate the endangered or vulnerable taxa, besides cataloguing the potentially medicinal and economically important plants.

Physiography: The Panchpatmali hill has a 17 km long and 20 m thick bauxite deposit. The highest elevation of the hill is 1336 m above msl and 450 m above the level of adjoining plains. Escarpments up to 10 to 30 m occur on all sides and thereafter gentle slopes extend towards the valley.

Climate: During summer, maximum temperature ranges from 28° to 31°C and the minimum from 16° to 20°C. During winter months the maximum temperature ranges between 7° to

14°C. April is the hottest and January the coldest month of the year.

Rainfall: The region receives rain from the southwest monsoon (June-September). In addition, occasional heavy showers are also received due to the northeast monsoon in the month of November and December, leading to many cloudy days. The annual average rainfall on the hill is 1520 mm with 20% variation.

Vegetational Analysis: The Panchpatmali hill at the bauxite ore deposit site has a very scanty vegetation except on the hill slopes or valleys where there is flow of water from streams. Broadly, the vegetation of the area can be designated as a mixed deciduous scrub jungle.

(a) **Flora on the hill top:** Since the plateau top is a table land with a calcareous hard surface there is no significant vegetation except a vast stretch of *Phoenix acaulis*. On rainy days, grasses and a few herbaceous elements occur, which make the vegetation appear as a grassland. The typical high altitude herbaceous plants found on the plateau region are *Pogostemon quadrifolius*, *Pimpinella heyneana*, *Exacum pedunculatum* and *Hypericum japonicum*. The other conspicuous plants are *Stachytarpheta indica*, *Commelina benghalensis*, *Crotalaria pallida*, *Kyllinga bulbosa*, *K. nemoralis*, *Cyperus* sp., and *Eriocaulon* sp. among others. At places where there is water accumulation and the soil is sandy/loamy, *Polygonum plebeium*, *P. barbatum*, *Borreria pusila*, *Mitracarpus verticillatus*, *Gnaphalium polycaulon* etc occur. The noteworthy insectivorous plants which often draw the attention of conservationists are *Drosera indica* and *D. burmannii*. The two alien species found in association with the above described plants are

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Chromolaena odorata and *Lantana camara* var. *aculeata* which appear to have been naturalised on the hill top in the course of time with human interference. Among the wild species of crop plants, *Oryza nivara*, which is believed to be the progenitor of cultivated rice *Oryza sativa*, was found growing on seasonal swamps on the hill top.

With the onset of winter, some new species sprout. Among them are *Vicoa indica*, *Viola betonicifolia*, *Oxalis corniculata*, *Sphaeranthus indica*, *Solanum surattense*, *Setaria pumila*, *Aerva sanguinolenta* etc. Very few twiners/climbers are observed at the plateau, obviously because they do not get any supporting shrub or tree species on which they can grow. However, *Chromolaena odorata* and *Phoenix acaulis* sometimes provide support to a few twining species like *Cocculus hirsutus*, *Thunbergia fragrans* var. *laevis*, *Asparagus racemosus*, *Hemidesmus indicus*, *Clematis roylei* and species of *Ipomoea* and *Dioscorea*. Surprisingly, not a single tree species is found on the plateau top. Half-metre deep trenches dug by bears and wild boar in search of succulent tubers are often seen on the plateau.

(b) Flora of the valleys and slopes:

The vegetation at the slopes and the valleys is represented by mixed deciduous forest. The tree species of economic importance are *Terminalia bellerica*, *Phyllanthus emblica*, *Mangifera indica*, *Artocarpus heterophyllus*, *Murraya koenigii* etc. The other dominant wild tree species found in association are *Trema orientalis*, *Caryota urens*, *Semecarpus anacardium*, *Alstonia venenata*, *Memecylon umbellatum* and species of *Ficus*, *Gardenia*, and *Bauhinia*. The shrubs commonly found are *Cipadessa baccifera*, *Wendlandia tinctoria*, *Clerodendrum* sp., *Woodfordia fruticosa* and *Indigofera cassioides*. The dominant robust climbers or lianas are represented by *Bauhinia vahlii* and *Schefflera venulosa*. Among the scandent shrubs *Ziziphus rugosa* (a wild relative of *Z. mauritiana*, an arid zone fruit plant) and *Jasminum arborescens* (wild jasmine) are found. Most interestingly, *Atylosia cajanifolia*, a wild relative

of *Cajanus cajan* (arhar) first described by Haines (1921) as an endemic species from Kuhuri forest of Puri district occurs on the slopes of Panchpatmali hill.

In the rocky crevices along the stream, *Thysanolaena maxima* and *Hypericum gaitii* are found in association with some fern species of *Pteris*, *Athyrium*, *Microlepis*, *Tectaria* etc. *Solanum torvum*, a potential indigenous medicinal plant is found occasionally on the hill slopes.

Along the roadside leading to the mining site, plants of the plains are noticed. They are *Celosia argentea*, *Pennisetum pedicellatum*, *Hydrophilla auriculata*, *Aerva lanata*, *Croton bonplandianum*, *Verbascum chinense*, *Parthenium hysterophorus* etc.

Statistical analysis of the Flora:

The flora of the region is represented by 160 wild and naturalised angiospermic species belonging to 53 families. The number and percentage of monocot and dicot families, genera and species are shown in Table 1.

TABLE 1

Groups	Families		Genera		Species	
	No.	%	No.	%	No.	%
Monocotyledons	9	21.42	29	27.35	34	26.98
Dicotyledons	42	78.58	106	72.65	126	73.02
Total	53		135		160	

The approximate ratio of monocot families to dicot families is 1:4.6, monocot genera to dicot genera is 1:3.6 and monocot species to dicot species is 1:3.7. Further, the approximate genus species ratio is 1:1.18, as against 1:2.4 for Bihar and Orissa (Haines, 1921-25 and Mooney, 1950) and 1:7 for British India (Hooker, 1907).

In order to get an insight into the relationship of the flora of Panchpatmali hill with that of Bihar and Orissa (Haines, 1921-25) and of India (Hooker, 1907) a comparative list of the dominant families of the region is provided in Table 2.

TABLE 2
FLORA OF PANCHPATMALI HILL, BIHAR AND
ORISSA, AND INDIA, A COMPARISON

Panchpatmali hill	Bihar and Orissa (Haines)	India (Hooker)
1. Poaceae	Leguminosae	Orchidaceae
2. Asteraceae	Graminae	Leguminosae
3. Euphorbiaceae	Cyperaceae	Graminae
4. Fabaceae	Compositae	Rubiaceae
5. Rubiaceae	Euphorbiaceae	Euphorbiaceae
6. Acanthaceae	Acanthaceae	Acanthaceae
7. Cyperaceae	Orchidaceae	Compositae
8. Lamiaceae	Rubiaceae	Cyperaceae
9. Scrophulariaceae	Labiatae	Labiatae
10. Solanaceae	Scrophulariaceae	Urticaceae

In the plantation programme, soil-conserving species, fast growing species (mostly exotics), indigenous forest species, ornamental flowering avenue trees and fruit bearing trees are selected. From the analysis of the comparative distributional pattern provided in Table 3, it is evident that as many as 7 species from among the scanty vegetation of the Panchpatmali hill occur both in Himalayas and Southern Peninsular region.

TABLE 3

Name of plant	Family	Other localities where it occurs
<i>Clematis roylei</i> Rehder	Ranunculaceae	Khasia hills
<i>Pimpinella heyneana</i> Kurz (DC.)	Apiaceae	Deccan hills
<i>Schefflera venulosa</i> (Wt. & Arn.) Harms	Araliaceae	Himalayas to South Deccan
<i>Exacum</i> <i>pedunculatum</i> L.	Gentianaceae	Khasia hills
<i>Justicia simplex</i> D. Don	Acanthaceae	Himalayas, Western Peninsula
<i>Pogostemon quadrifolius</i> (Benth.) Kuntze	Lamiaceae	Khasia, Deccan
<i>Osbeckia chinensis</i> L.	Melastomataceae	Deccan peninsula

CONCLUSION

The Panchpatmali hill possesses many elements of both Peninsular and Himalayan flora. Among them *Hypericum gaitii*, *H. japonicum*, *Clematis roylei*, *Pogostemon benghalensis*, *P. quadrifolius*, *Drosera indica*, *Exacum tetragonum*, and *Pimpinella heyneana* are noteworthy on the slopes. This confirms that higher elevations of Orissa have served as an intermediate step in the migration and stabilization of some species from the lower Himalayas to the hills of South India and viceversa (Patra and Choudhury, 1989). *Phoenix acaulis* which is present in such a vast range at the hill top, can be referred to as an indicator plant for bauxite ore.

NALCO has completed the plantation of about 100 hectares of land around Panchapatmali hill with more than 18 lakh saplings of 39 different species. A few exotic species have also been introduced in the area. Planting programmes are usually attempted to raise fast-growing tree species with almost complete exclusion of shrubs, climbers, rambling bushes and epiphytes that form the middle and lower canopy in a natural forest. Natural calamities like cyclones, frost or epidemic diseases and pests may damage man-made plantations to a greater extent. So, use of local broad-leaved deciduous species with exotic evergreens would give the necessary diversity to the vegetation cover, besides controlling atmospheric pollution and above all beautification of the area.

To obviate the lacuna due to the absence of the middle and lower canopy in man-made forests and also to ensure that all available plant species of the region are conserved, a Forest Park may be established which will serve as a "Gene Sanctuary" for the local flora. There is a vast diversity in the banana germplasm which should be collected, characterised and evaluated for its "built-inresistance" genes and utilised in the banana improvement programme. NALCO has already collected about 50 species of medicinal and economically important plants and has been maintaining them in its nurseries.

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